Journal of Conventional Weapons Destruction

Volume 7
Issue 2 *The Journal of Mine Action*

Article 13

August 2003

Taming the Minefields

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Taming the Minefields

Demining is a dangerous, labor intensive and costly process. An underlying precept of successful demining operation is a perfect safety record. The question is, how can a perfect saftey record be achieved while the overall cost of the demining operation be reduced at the same time? It is not an easy or simple task, but with a good tool box and a skilled management team this can be accomplished.

by Davor Druzijanic, *Mech. Eng., E.O.D.*

Introduction

The initial step in the demining process is preparation of a master plan. Preparation begins with gathering all accessible data such as mine reports, demining reports, mine accident reports, survey reports, maps of minefields, followed by a survey by deminers. During the survey, data about terrain, type of soil and vegetation, metal content or mineral contamination is collected. A working plan should be outlined on a map using a scale of 1:5,000 to identify where areas will be marked for each demining method used.

Constant in the overall process is the education of the whole staff engaged in demining: field leaders, team leaders, deminers, dog handlers, machine crews, operators, medical teams, etc. The aim is to develop expertise with intensive learning of methods, characteristics and limits of instruments used in demining. This is the only way it is possible to create an automatic reaction: safety first.

Development of any plan entails an assessment of available demining capabilities including mechanical mine clearing machines, mine detecting dogs (MDDs), skilled deminers with metal detectors and prodders, and in the near future, some new methods or instruments for selection, location and detonation of mines. Machines can improve safety and productivity in demining, especially in areas covered with dense vegetation. The use of demining machines, in combination with other methods, has proven to be the most successful, as no single method can guarantee 100 percent effectiveness if used alone. Another advantage of mechanical mine clearance is the ability to treat the soil to the depth of 20 cm, unlike prodders and metal detectors. In areas of dense vegetation, slopes along rivers or along artificial water channels, an excavator with an armored cab and vegetation cutter on an extended crane combined with manual demining may assure effectiveness and safety. For safety reasons, it is recommended that the excavator base be located only in safe or previously cleared areas.

Based on our experience, the unmanned mine clearing vehicle, RHINO, (designed, developed and produced by Rheinmetall Landsyteme GmbH in Kiel, Germany, operated by a mobile, video-based, radio remote-control system) is an ideal tool for demining large agricultural areas, especially in combination with MDDs and skilled deminers. RHINO has been used by our firm since 1998 and has proven to be safe and effective for both users and the environment. To date, it has destroyed more than 2,000 AP mines and 500 AT mines and has cleared over 7,000,000 sq m of mine contaminated land.

Another important element of the overall demining plan is the logistics annex. The movement of equipment, the care and maintenance of equipment, personnel and dogs, communication systems, medical evacuation, etc. are all crucial to the success of the mission. Only when all of the above are taken into consideration and the preparation is complete, can a safe and an effective demining operation begin.

Demining in Croatia

For demining of areas near Nustar, located close to Vinkovci City, three teams of deminers were employed. Each team had one team leader and four deminers. Each deminer was equipped with a metal detector, a prodder, a ballistic waistcoat and a helmet. Based on the mine reports, manual demining began at three different parts of the field, respecting the safety distances, to preparing for machine access. After mines had been located, some of them were destroyed *in situ* and others were rendered safe at the place designated for destroying the mines.

The area was then cleared by RHINO, with the exception of the channel at the east and higher slope at the west. The channel and the high slope (areas with trees and dense vegetation) were cleared mechanically by excavator MVB006 (rented for this task). The whole area was controlled by deminers with metal detectors and prodders, followed by four dog handlers with eight MDDs. Dogs work in pairs checking the area.

Main facts about the demining task:

Starting date	April 22, 2003
Fifteen deminers worked for 12 working days	Based on the reports
RHINO cleared	150,000 sq m in 14 days 11,250 sq m after MVB006
MVB006 cleared	38,500 sq m in 12 days
Fifteen deminers controlled	78,962 sq m in 12 days
Four demining dog teams controlled	98,286 sq m in 10 days
Completion date	May 25, 2003
Cleared area	177,248 sq m in 33 days

Machines Involved in Demining

There are two basic types of demining machines: remote controlled and directly controlled. Remote controlled demining machines can be used on flat terrain, without bigger slopes and tall trees. Directly controlled demining machines can be used on the fields where operator response should be quick and precise, depending on terrain and vegetation or other. Demining machines with a flail tool can be used on rocky areas. Demining machines are not able to operate effectively in swampy areas.

Remote controlled demining machines should have radio control systems with video surveillance, at the range of 1,000 m in an open space, and automatic depth control. Before using machines in the new environment, e.g. another country, tests with 50 of the smallest mines or surrogates should be made in the area at depths of 0, 5, 10, 15 and 20 cm. Self recovery and fire fighting equipment is preferred.

Directly controlled demining machines should also be tested with the smallest mines, but only after passing the cab pretest. Cab walls should be tested with five fragmentation mines. The cab bottom should be tested with two AT mines with Misnay Sharidon Effect. If this type of AT mine is not available in the particular area, two of the strongest AT mines should be used to test penetrability. The cab should be tested by ten-kilogram TNT blasts. The explosion should occur one meter in front of the cab, and airwave impulse should be less than the medically recommended level. The cab should be equipped with a radio communication unit and with airbags at the sides and roof, as well as with an air conditioning system.

About AKD MUNGOS Ltd.

AKD MUNGOS Ltd. was established by the government of the Republic of Croatia, on March 28, 1996, for performing mine-clearance activities on the territory of the Republic of Croatia. The company has been performing mine clearance tasks since June 1, 1996. The Croatian Mine Action Center has coordinated the mine clearance activities since 1998. In accordance with the changes of the Croatian law, mine clearance activities have become completely commercialized. Thus, Mungos Ltd. was introduced to the market, along with a few other firms, as undoubtedly the biggest firm in the country.

At the beginning of its activities, AKD MUNGOS Ltd. had only 80 employees compared to the current 266:

- 186 pyrotechnics
- 34 medical personnel—10 medical teams, consisting of a doctor, a driver and an ordinary, for each group of pyrotechnics engaged in field operations
- 6 dog handlers with 12 mine detection dogs
- 40 technical and logistic personnel

The company owns:

- 70 motor vehicles
- High-quality protection equipment and a corresponding number of


View from the top of the RHINO control truck (3x zoom).


RHINO in operation.


MVBOO6 in operation, Croati


RHINO demining in frozen ground, February 2003.


Mine detection dog in practice.

mine detectors and other equipment necessary for effective performance of field operations

- Warehouses for explosives
- Explosive transport vehicles
- A RHINO—mine clearance machine purchased from Rheinmetall Landsysteme GmbH, Kiel, Germany
- Armored excavator Hydrema Weimar M1520 and M1000, both with vegetation cutter MFV1000, purchased from Franjo Vukic, Zagreb, Croatia

The most valuable assets of the firm are not solely equipment and machinery, but highly qualified personnel with years of real experience in mine clearance and unexploded devices removal pending the five-year Patriotic War in Croatia. AKD Mungos' deminers constantly attend different professional courses. Thus, the firm has special teams for:

- Underwater operations
- Alpine mountain operations
- MDDs with the training center and a capacity for dog training
- Experts for every kind of activity in demining
- Professors at the Deminers' Education Center in Zagreb

Projects

AKD MUNGOS Ltd. has located, rendered safe or destroyed more than 7,500 different kinds of AP and AT mines as well as more then 22,000 different UXO. AKD MUNGOS Ltd. has the capacity to perform demining all over the world in peace and in an emergency situation, and to manage corresponding education and training courses.

RHINO Mine Clearing System

The RHINO is a perfect tool for remote demining of large agriculture areas, especially in combination with mine detecting dogs or manual demining methods.

All details about RHINO can be found in SOP RHINO upon request. So far, the RHINO cleared:

	Cleared Area (m^2)
1998. (since June)	*613.872*
1999.	*1.727.402*
2000.	*1.075.967*
2001.	*1.736.623*
2002.	*1.366.952*
Total	*6.520.816*

With the maximum usage of mechanical mine-clearance, the company could clear over 1,000,000 sq m of mine-infested areas per month. Mechanical demining, in combination with the quality control performed manually by deminers with metal detectors and prodders or dogs guarantees 100 percent efficiency and safety. With intensive use for more than 10,000,000 sq m of cleared area per year, the average price could be reduced to $2.00 (U.S.)/sq m if not more and while providing 100 percent quality assurance. ■

Year	Number of Projects	Cleared Area (m^2)
1996. (since June)	*35*	*2.499.155*
1997.	*151*	*8.358.187*
1998.	*84*	*7.617.669*
1999. - Croatia	*70*	*5.564.468*
Kosovo	*7*	*170.000*
B I H	*4*	*403.729*
2000. - Croatia	*42*	*5.797.959*
B I H	*2*	*122.950*
2001. - Croatia	*39*	*5.739.578*
2002. - Croatia	*41*	*8.982.337*
Total	*475*	*45.256.032*

■ RHINO machine at work in the minefields.

**All graphics courtesy of the author.*

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